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ABSTRACT

Implementation is a key factor in shaping school policies. The Procedures for Adopting Educational Innovations Project conducted longitudinal studies of innovation implementation based on the Concerns-Based Adoption Model (CBAM). A key dimension of CBAM, Levels of Use of the Innovation (LoU), was assessed in three longitudinal studies over a two-year period. The samples were approximately 190 elementary school teachers in three states implementing team teaching, approximately 160 university professors implementing instructional modules, and 45 elementary school teachers implementing the Science Curriculum Improvement Study. Data indicate that the hypothesized LoU exist and that individuals tend to move to Routine Level IVA, with this level becoming a basis for later refinement. Most individuals begin use at the Mechanical Level (LoU III), which is not necessarily resolved by the end of the first cycle of use. There is movement both up and down the levels, and institutional variables affect that movement. Implications are that evaluators should consider LoU in designing studies and interpreting data; staff developers can use LoU to individualize staff development activities; and policy-makers should provide prospective adopters of their innovations with information about the Levels of Use under which they obtained reported evaluation results. (Author)

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A LONGITUDINAL INVESTIGATION OF INDIVIDUAL IMPLEMENTATION OF EDUCATIONAL INNOVATIONS

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A LONGITUDINAL INVESTIGATION OF INDIVIDUAL IMPLEMENTATION OF EDUCATIONAL INNOVATIONS[1,2]

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The implementation of innovations is the present focus of study for policy-makers, researchers, evaluators, and staff developers. Implementation is increasingly being recognized as a critical factor in shaping the realities of school practices. In the past, studies of educational change focused on institutional planning and support structures, attitudes about a specified change, and the institutional variables that affect the "success" of change. Rarely have studies focused on the individual innovation adopter with respect to how s/he uses the innovation, how that use matures and changes, and what effects actions or conditions outside of the individual have on use of the innovation.

From a research design point of view, most of the implementation, evaluation, and change studies have been either a post hoc analysis of a success (or failure) at school change, a single sampling cross-sectional survey, or a short

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[1]Paper presented at the annual meeting of the American Educational Research Association, New York, April 8, 1977.

[2]The research described herein was conducted under contract with the National Institute of Education. The opinions expressed are those of the author and do not necessarily reflect the position or policy of the National Institute of Education, and no endorsement by the National Institute of Education should be inferred.

time period pre-post design to determine the effects of a particular innovation. Long-term longitudinal studies are more difficult to design and manage and financial support is very rarely available.

Necessity as well as classroom reality have forced the staff of the Procedures for Adopting Educational Innovations Project to face these issues. The conceptual basis for the project is the Concerns-Based Adoption Model (CBAM) (Hall, Wallace, & Dossett, 1973) which focuses on the individual. One of the key dimensions of the CBAM is Levels of Use of the Innovation (LoU) which describes different types of behaviors that individuals demonstrate as they move from nonuse to highly sophisticated use of an innovation. Eight different Levels of Use have been identified and operationally defined (Hall, Loucks, Rutherford, & Newlove, 1975). Since the CBAM hypothesizes that there are eight different Levels of Use of an innovation, research designs of necessity have had to entail longitudinal studies with repeated measures, rather than simply relying on past or pre- and post-assessments of the implementation effort.

In this paper, data will be presented from three longitudinal studies in which the Levels of Use dimension was assessed over a two year period. In one study, approximately 190 teachers in elementary schools in three states were followed in relation to the innovation of team teaching. In a second study, approximately 160 college and university professors were followed for a two-year period in relation to the innovation of instructional modules; and in the third longitudinal study, 45 elementary school teachers were followed as they implemented the Science Curriculum Improvement Study (SCIS) science curriculum.

Assumptions of CBAM Research

Several key assumptions underlie the Concerns-Based Adoption Model (CBAM) and were influential in the measures, procedures, and designs of the three studies.

1. The implementation of innovations is a process rather than an event. Innovations are not adopted and fully used simply because a superintendent makes a decision. Implementation is not complete as a result of the experiences and input received in a two-day workshop. Rather, implementation of innovations typically requires extended use, experimentation, and exploration; it very much represents a learning experience. Implementation is not a simple dichotomous, yes-no phenomenon.
2. The implementation of innovations is done by individuals. Although there may be a school system or a university policy that states that a certain innovation will be adopted, the actual implementation of that innovation will be carried out by individuals. Therefore, the individual innovation users and nonusers need to be the focus of much research on the change process.
3. Implementation of innovations from the individual's perspective entails developmental growth. A series of levels have been proposed that describe individuals' behaviors as they acquire skill and proficiency in using an innovation. These levels are not necessarily lock-step since there are many factors which may intervene upon the users as they are involved in implementing the innovation. However, in general there appear to be identifiable Levels of Use of an Innovation that individuals demonstrate during the implementation process.
4. The concept of Levels of Use is applicable to both process and product innovations and is applicable in both school and college settings. That is, the phenomenon of different Levels of Use of an Innovation occurs for individuals with different innovations and within different organizational contexts.
5. The amount of time required to implement an innovation will vary depending upon such factors as the complexity of the innovation, the amount of

support that is provided, the skill of the individuals involved, as well as user system characteristics and conditions.

Based upon these assumptions, the study of the implementation of innovations requires that the individual be a unit of analysis and the basic unit for data collection. Further, before conclusions can be drawn about the implementation of a particular innovation, there needs to be a sampling of individuals that would be representative of each Level of Use. In theory, this stratification of the sample of individuals can be accomplished through either a cross-sectional study or through longitudinal repeated sampling. In the data reported here, we will briefly look at an initial cross-sectional sampling of individuals and then follow the sample with repeated measures throughout the two-year longitudinal studies.

Levels of Use of the Innovation

Levels of Use of the Innovation proposes eight different levels that describe the behaviors than an individual demonstrates in relation to an innovation. The Levels of Use range from no knowledge and no action in relation to an innovation to highly sophisticated, highly experienced, highly innovative use of the innovation. These levels have been operationally defined (Hall, Loucks, Rutherford, & Newlove, 1975). Figure 1 summarizes the overall definition of Levels of Use and the decision points that separate each level. The Levels of Use dimension focuses on the behaviors of individuals rather than their feelings. Another dimension of the Concerns-Based Adoption Model, named Stages of Concern About an Innovation (Hall & Rutherford, 1976), focuses on the affective dimension of individuals through assessing their concerns in relation to the innovation.

In general, the Levels of Use progression is hypothesized to move from an orienting time to a decision to use, to a mechanical kind of use of the innovation,

Figure 1

Levels of Use of the Innovation[3]

0 NONUSE: State in which the user has little or no knowledge of the innovation, no involvement with the innovation, and is doing nothing toward becoming involved.

I ORIENTATION: State in which the user has recently acquired or is acquiring information about the innovation and/or has recently explored or is exploring its value orientation and its demands upon user and user system.

II PREPARATION: State in which the user is preparing for first use of the innovation.

III MECHANICAL USE: State in which the user focuses most effort on the short-term, day-to-day use of the innovation with little time for reflection. Changes in use are made more to meet user needs than client needs. The user is primarily engaged in a stepwise attempt to master the tasks required to use the innovation, often resulting in disjointed and superficial use.

IVA ROUTINE: State in which use of the innovation is stabilized. Few if any changes are being made in ongoing use. Little preparation or thought is being given to improving innovation use or its consequences.

IVB REFINEMENT: State in which the user varies the use of the innovation to increase the impact on clients within immediate sphere of influence. Variations are based on knowledge of both short- and long-term consequences for clients.

V INTEGRATION: State in which the user is combining own efforts to use the innovation with related activities of colleagues to achieve a collective impact on clients within their common sphere of influence.

VI RENEWAL: State in which the user reevaluates the quality of use of the innovation, seeks major modifications of or alternatives to present innovation to achieve increased impact on clients, examines new developments in the field, and explores new goals for self and the system.

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[3]Excerpted from: The LoU chart: Operational definitions of Levels of Use of the Innovation. Austin: Research and Development Center for Teacher Education, The University of Texas, 1975.

and ultimately to an integrated use of the innovation. The LoU dimension is not at all limited to classroom behaviors of the user, but takes into account behaviors at all times and in all places relative to the innovation. For example, the person at the Orientation Level is looking for information (e.g., at a professional meeting), considering the strengths and weaknesses of using the innovation (e.g., by talking with others), is involved in acquiring information (e.g., by reading brochures), and assessing potential gains and losses associated with use of the innovation (e.g., by estimating time and costs).

It is hypothesized that the kinds of behaviors that the innovation user demonstrates during the Orientation Level of Use are altogether different from the kinds of behaviors that would be found with innovation users at some other level. For example, at the Mechanical Level of Use, the user is looking for ideas and techniques to make use of the innovation more efficient, rather than soliciting general, descriptive information as s/he would be at the Orientation Level. At the Mechanical Level also, there is disjointed and uncoordinated use of the innovation in the classroom. The user is heavily involved in management issues. The user's guide may be close at hand and referred to quite often. The day-to-day logistics entailed are planning for and using the innovation.

Rather than LoU representing a description of adoption and implementation as application of the innovation in its pure form in a new setting, LoU focuses on the underlying changes in use, the "adaptations," if you wish, the individual users make. For example, changes in management techniques are indicative of the Mechanical Level. The presence or absence of changes and the kinds of changes that are made are keys to determining at what Level of Use an individual is currently functioning. Even the most teacher-proof curriculum box entails the user's development of new skills and varying the approach to using the innovation as these skills are learned and problems are encountered. Definition,

description, and analysis of how the individual uses the innovation and adapts it are the focus of LoU.

Although the Levels of Use dimension is laid out in a linear fashion, it is not proposed that an individual must move automatically in lock-step fashion through each of these levels. The thrust of the research reported here and in other papers is to test the developmental progression of individuals as they move from level to level and to determine to what extent the development across these levels is sequential versus varying in other perhaps unpredictable ways. In earlier papers, the initial verification that the different Levels of Use of the Innovation exists has been documented (Hall, 1975; Loucks, 1976). At this time, individuals at each of the eight Levels of Use have been identified with several different innovations so that it is at least initially verified for both process and product innovations that the eight different Levels of Use exist. The question still remains as to just how developmental the movement is across these levels and in what ways movement and nonmovement can be influenced through interventions and institutional conditions.

Measuring Levels of Use of the Innovation

Levels of Use are assessed using a focused interview procedure. The Levels of Use Interview does not involve a strictly structured set of questions, but rather it uses a branching format based on a set of Decision Points and the operational definitions of Levels of Use. An interview procedure was developed since the concept of Levels of Use entails so many different types of behaviors and these take place in so many different locations. Straightforward classroom observation might be possible to assess Levels of Use in relation to the performance of the individual user in the classroom; however, use of an innovation entails outside-of-class preparation, review and examination of materials, discussion with colleagues, coordination, and planning activities that would

not be detected through pure classroom observation. The only cost-feasible approach seemed to be an interview procedure.

The term "focused interview" is used advisably here since the interviewer, through the use of specific interview questions, a branching format, and carefully designed follow-up probes, is able to elicit a great deal of information about the various activities and performances of an individual in relation to an innovation. In addition to assessing the overall Level of Use, the Levels of Use concept is divided into eight categories which provide for additional data points in the conducting of an interview. These categories cover such areas as the individuals' knowledge of the innovation, the kinds of information that they are seeking, their plans, and what they share with others, as well as their actual performance in the classroom with the innovation. It should be noted that the LoU Interview covers nonusers as well as users of the innovation under study.

In the research of the Procedures for Adopting Educational Innovations Project, trained interviewers have conducted more than 3,000 interviews with twelve different innovations. A trainer's manual has been developed to provide the basic information which is required of others who are going to be involved in using the Levels of Use Interview (Loucks, Newlove, & Hall, 1976). Each interview is tape recorded and subsequently rated by a second trained rater as a part of data collection procedures. For the data reported here, interrater reliability coefficients ranged from .87 to .96. A validity study of the Levels of Use Interview procedure using an ethnographic methodology resulted in correlations of .98 between ratings given by an ethnographer who had spent one complete school day in observation of an individual with ratings obtained through the focused interview procedure. The LoU measurement procedure development and reliability findings are summarized by Loucks (1977).

Findings

The remainder of this paper focuses on cross-sectional and longitudinal LoU data collected over a two-year period. For each set of data, there is a brief discussion and then some propositions are stated based on data interpretation. Cross-sectional data are presented first.

Results of Cross-Sectional Studies

During the fall of 1974, two cross-sectional samples were selected. Both samples were chosen to represent a range of experiences with the innovations of teaming or modules. Nonusers were selected as were individuals having one to four or more years of experience with the innovations. General demographic data about these two samples are presented in Table 1. During the early fall, each of these individuals participated in an LoU Interview. The Levels of Use distributions for these two samples are displayed in Tables 2, 3, and 4. Table 2 is a summary of the overall Levels of Use rating for 402 teachers in elementary schools in relation to the innovation of team teaching and 351 college and university professors in relation to the innovation of instructional modules. In Tables 3 and 4, the individual's Level of Use rating is contrasted with years of experience with the innovation. The following propositions are developed based on these data:

> PROPOSITION 1. FOR BOTH INNOVATIONS, THERE WERE INDIVIDUALS IDENTIFIED AT EACH LEVEL OF USE. As had been hypothesized in the original research, individuals at each Level of Use were identified. Further, there were individuals located at each LoU for both innovations. However, the distribution is not the same for both innovations.

> PROPOSITION 2. IN A STRATIFIED SAMPLE ACCORDING TO YEARS OF EXPERIENCE, THE DISTRIBUTION OF EACH LEVEL OF USE WILL NOT BE THE SAME FOR BOTH INNOVATIONS. The distribution of the nonuse levels (LoU 0, I, and II) would naturally vary depending upon the size of the sample of nonusers. In this case, the samples were stratified according to years of experience with an attempt being made to

Table 1

Demographic Data about the Teaming and Module Samples

		TEAMING SAMPLE	MODULE SAMPLE
Sex:	Female	88.8%	27.6%
	Male	11.2%	72.4%
Age:	20-29	42.8%	6.8%
	30-39	19.9%	30.7%
	40-49	18.6%	35.5%
	50-59	12.6%	22.6%
	60-69	6.0%	4.4%
Average Number of Years Teaching		10.2	11.0
Average Number of Years at Present School		6.1	7.5

Table 2

Percentage Distribution of Overall Level of Use for Two Innovations

		TEAMING IN ELEMENTARY SCHOOLS		INSTRUCTIONAL MODULES IN COLLEGES	
LEVELS OF USE		Absolute Frequency	Percentage	Absolute Frequency	Percentage
0	Nonuse	29	7.2	36	10.3
I	Orientation	36	9.0	106	30.2
II	Preparation	10	2.5	34	9.7
III	Mechanical Use	80	19.9	27	7.7
IVA	Routine	208	51.7	78	22.2
IVB	Refinement	22	5.5	37	10.5
V	Integration	11	2.7	24	6.8
VI	Renewal	6	1.5	9	2.6
		402	100.0	351	100.0

Table 3

Comparison of Levels of Use of Teaming by Years of Experience

LEVELS OF USE		YEARS OF EXPERIENCE				
		No Experience	1 Year	2 Years	3 Years	4 or More Years
0	Nonuse	27.4%	2.9%			3.7%
I	Orientation	38.7%	4.9%		1.4%	3.7%
II	Preparation	1.6%	7.8%	3.8%		
III	Mechanical Use	21.0%	35.0%	15.4%	11.3%	9.2%
IVA	Routine	9.7%	42.7%	76.9%	71.8%	67.0%
IVB	Refinement		4.9%		8.5%	9.2%
V	Integration		1.9%	3.8%	7.0%	2.8%
VI	Renewal	1.6%				4.6%
TOTAL N = 371	n =	62	103	26	71	109

Table 4

Comparison of Levels of Use of Modules by Years of Experience

LEVELS OF USE		YEARS OF EXPERIENCE				
		No Experience	1 Year	2 Years	3 Years	4 or More Years
0	Nonuse	17.9%	3.2%		6.3%	9.1%
I	Orientation	62.4%	7.9%	17.0%	6.3%	9.1%
II	Preparation	15.4%	9.5%		3.1%	
III	Mechanical Use	.9%	17.5%	8.5%	9.4%	12.1%
IVA	Routine	1.7%	31.7%	44.7%	31.3%	30.3%
IVB	Refinement	.9%	17.5%	17.0%	28.1%	12.1%
V	Integration	.9%	9.5%	8.5%	9.4%	24.2%
VI	Renewal		.7%	.7%	.7%	.3%
TOTAL N = 292	n =	171	63	47	32	33

identify schools and colleges where there were users, as well as institutions that were not involved with the identified innovations. Several institutions were selected because of their potential for movement over the two years of the study.

PROPOSITION 3. THE LARGEST NUMBER OF USERS WILL BE AT THE IVA ROUTINE LEVEL OF USE. For both innovations, the distributions are heaviest at Level of Use IVA. Sixty-four percent of the users of teaming were at Level of Use IVA Routine, and forty-five percent of the module users were at Level of Use IVA. The Routine Level of Use appears to be the point at which most users of innovations are found.

PROPOSITION 4. FEW INDIVIDUALS WILL BE FOUND AT LEVELS OF USE V AND VI. For both innovations, the number of individuals at Levels of Use V and VI were relatively small. This has also been true of other innovations that have been studied.

PROPOSITION 5. THE EVIDENCE OF THE MECHANICAL LEVEL OF USE IS HIGHEST AMONG FIRST-YEAR USERS. Thirty-five percent of the first-year users of teaming and seventeen and a half percent of the first-year users of modules were at a Mechanical LoU (see Tables 3 and 4). For the teaming data, most if not all of the "No Experience" individuals were in their first year of teaming as well, which means that the majority of first-year teamers are of an LoU III. The proportion of individuals at LoU III for teaming remains high for several years, suggesting that implementing teaming is much more difficult than is the implementation of modules.

Results of Longitudinal Studies

In the cross-sectional data reported here and elsewhere (Loucks, 1976), it is clear that the different Levels of Use can be identified within a sample population. However, questions about the type of movement from one Level of Use to another still remain. Just how "developmental" is it? How do the rates vary? And, are there certain patterns involved in the shifts from one Level of Use to another? In this section, some of the longitudinal data that were collected over the two years will be explored. Levels of Use Interviews were conducted first in the fall of 1974, then repeated in the spring of 1975, the fall of 1975, and the spring of 1976. Each time the basic Levels of Use Interview procedure was used. All tapes were rated a second time with a consensus

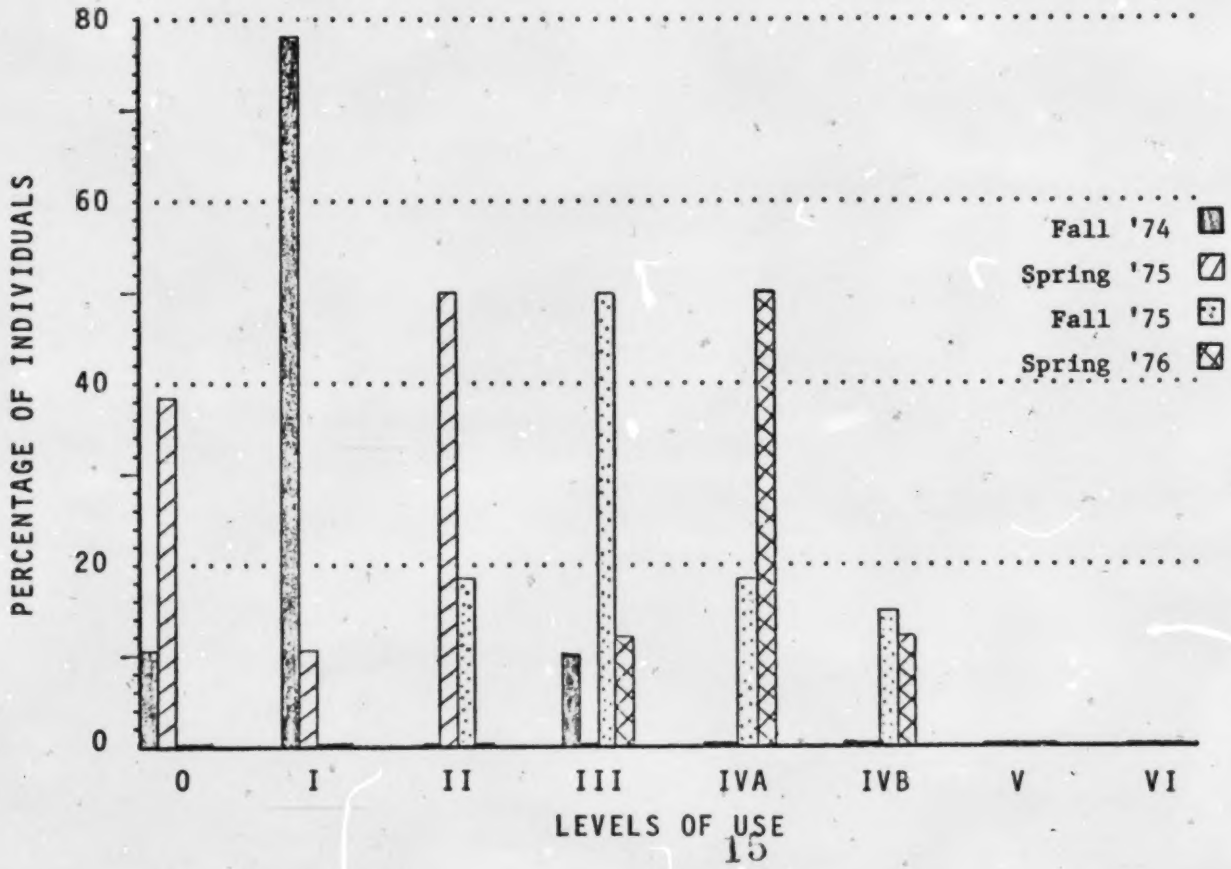
rating being developed in cases of disagreement so that reliable ratings were obtained for each individual.

In the subsequent sections, some sample data from schools, as well as from the samples as a whole, will be explored. The data presentation section ends with a brief look at a small longitudinal case study involving the Science Curriculum Improvement Study (SCIS) teachers in which more data collection points were utilized.

School Level Longitudinal Data. Figure 2 illustrates sequential LoU growth of teachers in one elementary school with respect to the innovation of teaming. At the beginning of the study, this school faculty was exploring teaming, most teachers had implemented and reached at least a Routine Level of Use by the time of the final data collection period two years later.

Figure 2

LoU Distributions of Individuals in School A Over a Two-Year Period



PROPOSITION 6. AT THE BUILDING LEVEL, IT IS POSSIBLE FOR INDIVIDUALS TO MOVE IN A SOMEWHAT LINEAR FASHION FROM LEVEL OF USE 0 TO LEVEL OF USE IVA.

These data hint at a developmental progr ssion of Levels of Use, at least to Level of Use IVA Routine. The dominant pattern of movement of the school's faculty began in the fall of 1974 with many individuals at Level of Use I Orientation. By the spring of 1975, most individuals were at Level of Use II Preparation. In the fall of 1975, most individuals were at Level of Use III Mechanical, and by the spring of 1976, the largest number of individuals had moved to Level of Use IVA Routine.

PROPOSITION 7. MOVEMENT IN LEVELS OF USE IS NOT A CERTAINTY.

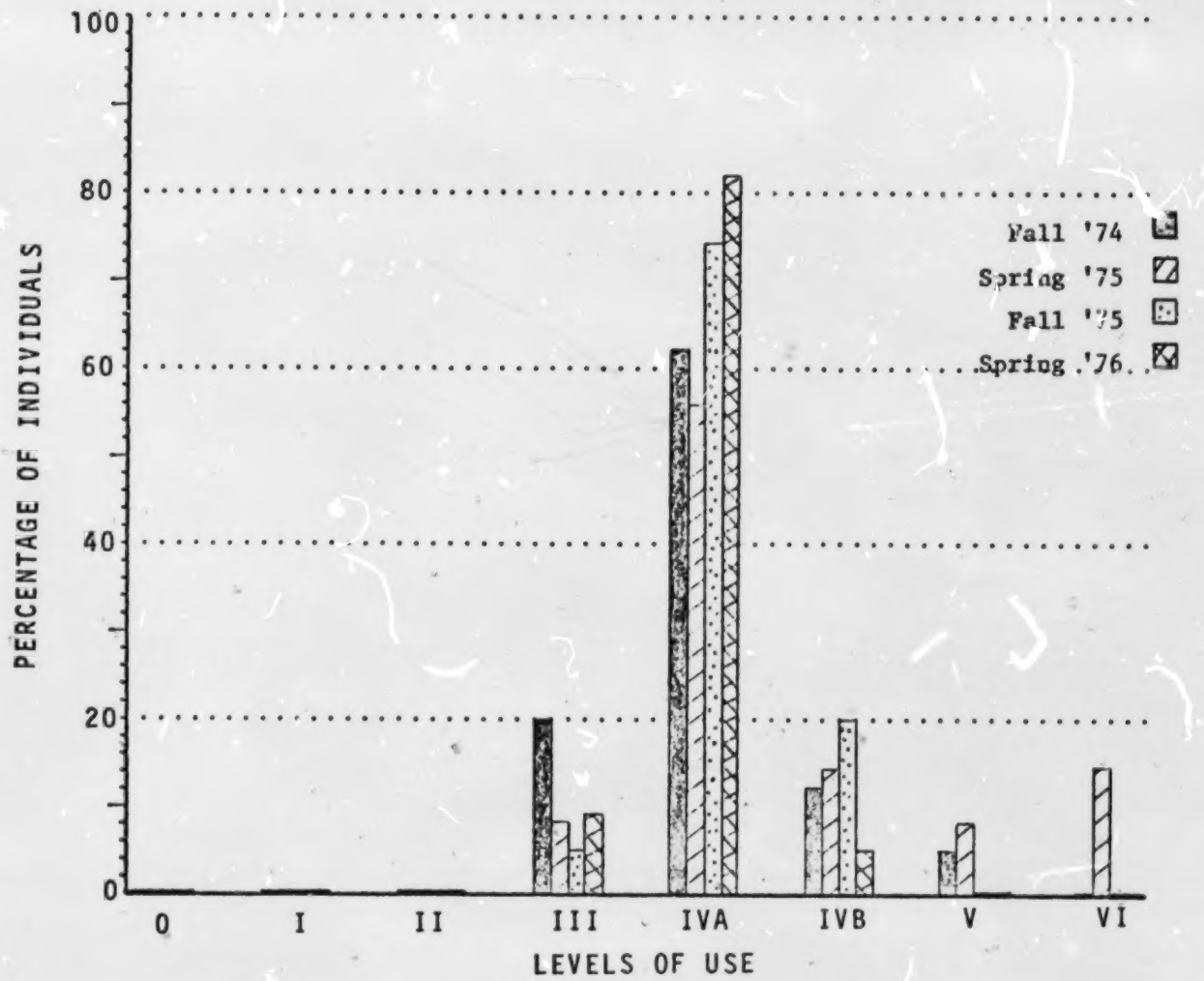
Figure 3 illustrates a school in which teaming had been fully implemented at the beginning of the study and no particular changes were made by individuals during the two years of the study. Most individuals began the study at Level of Use IVA Routine, and most individuals remained at this Level throughout the two-year period. Note that this does not necessarily mean it was the same individuals all the time at Level of Use IVA, it just indicates that at each data collection period the largest number of individuals were at IVA.

PROPOSITION 8. DIRECTION OF MOVEMENT IN LEVELS OF USE IS NOT ALWAYS TOWARDS HIGHER LEVELS.

Figure 4 illustrates a very different school situation. In this school, most of the individuals began the 1974-75 school year at Levels of Use I, II, and III. By the spring of 1975, most had moved to Level of Use III or IVA. However, in the fall of 1975, the largest number of individuals had moved back to Level of Use 0, I, or III, and by the final spring of 1976, most individuals had moved to nonuse levels, with a few having moved higher to LoU IVB or V. The large increase in nonusers was the result of a major community intervention in that school over the summer and at the beginning of the second year of the

Figure 3

LoU Distributions of Individuals in School B Over a Two-Year Period



study. This movement was towards the cessation of teaming, the removal of open classrooms, and "back to basics."

The module sample offers similar illustrations of institutional dynamics. Figure 5 represents a university of mostly nonmodule users. When the study was initiated, individual activity related to modules was high as they were orienting themselves to the concept of modules. However, as the study continued

Figure 4

LoU Distributions of Individuals in School C Over a Two-Year Period

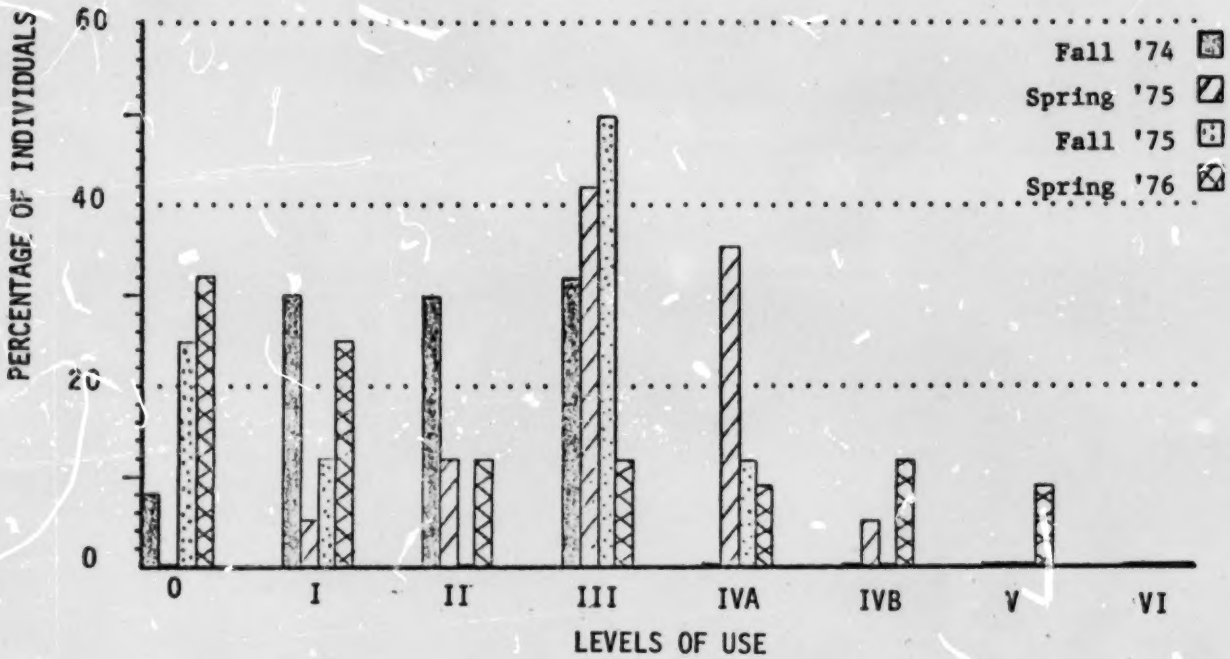
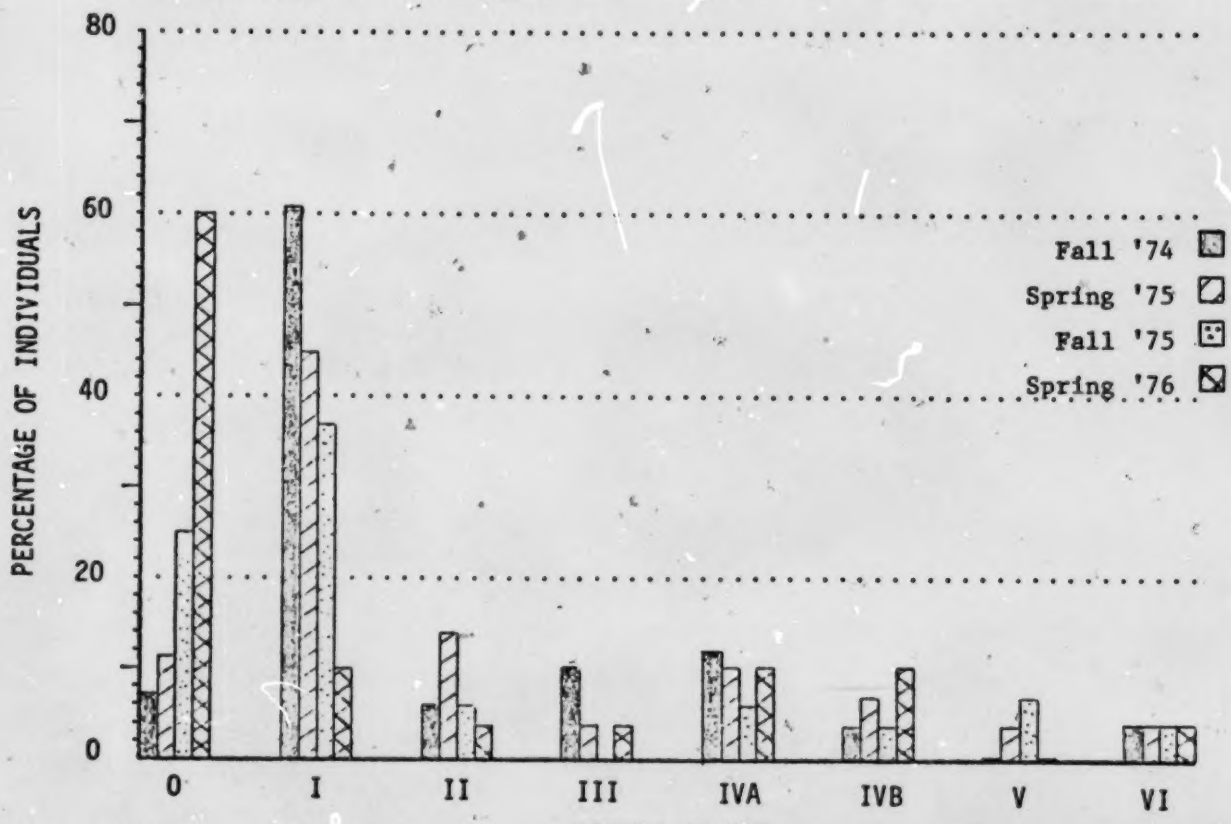


Figure 5

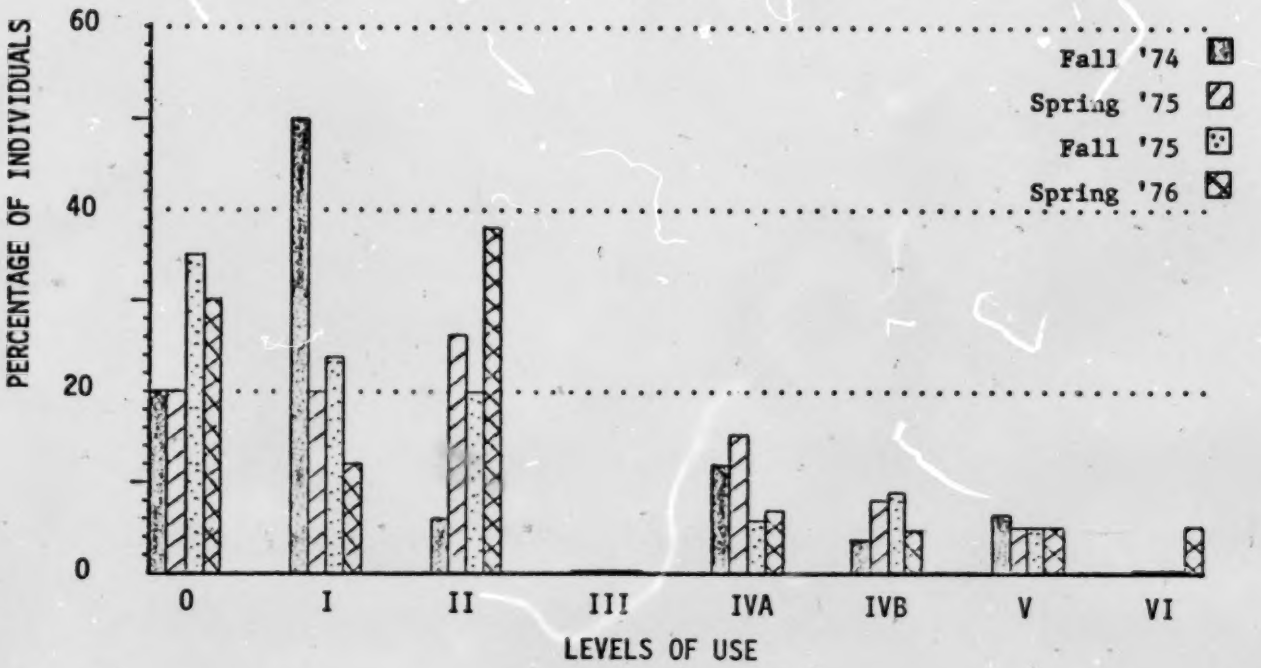
LoU Distributions of Individuals in University A Over a Two-Year Period



activity waned. Eventually, it resulted in approximately 60 percent of the individuals being at Level of Use 0. In contrast, Figure 6 illustrates a university where a major and slow effort was taking place to orient and prepare the faculty to use modules. The two years involved exploring and writing modules in preparation for use the following year. This figure also illustrates the existence of individuals who in the course of two years decided against the use of modules, thus returning to LoU 0 and nonuse.

Figure 6

LoU Distributions of Individuals in University B Over a Two-Year period



Longitudinal Data for the Samples as a Whole. In order to get a better picture of the probable movement of individuals from one Level of Use to another over the two-year data collection, the movement from one Level of Use to another was tallied, then averaged and summarized in Tables 5 and 6. For each of the three transition periods, the percentage of individuals who moved

up or down from a given Level of Use is recorded. The three transition periods were: fall 1974-spring 1975, spring 1975-fall 1975, and fall 1975-spring 1976. For the teaming sample, averaging the three transition periods, 69.5 percent of the individuals remained at LoU 0, while 14.7 percent of the individuals moved up one level and 15.8 percent moved up more than one level.

Table 5

LoU Developmental Trends in Relation to Modules

Changing From This LoU	Down More Than One Level	Down One Level	Stay the Same	Up One Level	Up More Than One Level
0			71.9	14.0	14.0
I		24.7	42.0	18.5	14.8
II	10.2	27.1	25.4	18.6	18.6
III	23.9	6.5	17.4	21.7	30.4
IVA	20.4	1.9	43.7	20.4	13.6
IVB	14.0	28.1	40.4	12.3	5.3
V	36.6	29.3	14.6	19.5	
VI	60.0	26.7	13.3		

Table 6

LoU Developmental Trends in Relation to Teaming

Changing From This LoU	Down More Than One Level	Down One Level	Stay the Same	Up One Level	Up More Than One Level
0			69.5	14.7	15.8
I		34.7	24.5	16.3	24.5
II	4.3	8.7	17.4	47.8	21.8
III	11.8	1.5	19.1	51.5	16.2
IVA	3.7	7.1	74.1	10.5	4.6
IVB	11.5	50.8	23.0	13.1	1.6
V	52.4	14.2	14.2	19.2	
VI	77.8	11.1	11.1		

In contrasting the figure summaries for teaming and for modules, several similarities can be identified as well as some interesting differences. For example, it appears that there is a greater variation in the module data with much more movement occurring from level to level and with more individuals moving up more than one level between the data collection periods. We suspect that this is due to the fact that the adoption and implementation of modules can be accomplished by an individual and in one semester's period of time. Not only can Level of Use increase, but also course assignments could change so that modules could no longer be used (i.e., change from use to nonuse levels), or adaptations in the modules could be made (i.e., more frequent occurrence of LoU III, IVB, and above). On the other hand, teaming in schools has a "cycle" of use of one school year. The individuals are bound to other individuals and obligated to work with them so that the shifts in Level of Use would be more dependent on how others are doing, thereby slowing the rate of adaptation.

Some of the trends across both groups are worth noting.

PROPOSITION 9. INDIVIDUALS DO NOT REMAIN AT LEVELS OF USE II PREPARATION AND III MECHANICAL FOR VERY LONG. Individuals at Levels of Use II and III seem to move onto higher Levels of Use or move back towards lower Levels of Use more quickly than do those at Levels of Use 0, I, IVA, and IVB. Note: A great deal of caution has to be maintained in interpreting Levels of Use V and VI since the number of individuals at these levels is relatively small.

PROPOSITION 10. THE LARGEST NUMBER OF INDIVIDUAL INNOVATION USERS ARE THOSE WHO REMAIN AT LEVEL OF USE IVA ROUTINE. It appears that Level of Use IVA is the equilibrium point, the Level that is most stable. The largest percentage of any group are the individuals at Level of Use IVA.

Perhaps Table 7 will provide further insight into the Levels of Use IVA issue. In Table 7, the data from Tables 5 and 6 were further reduced by summing the percentages of both upward movement columns and both downward movement columns. In this figure, it is possible to see more clearly the dominant direction of movement. Interpretation of these data lead to Proposition 11.

PROPOSITION 11. ALL ROADS LEAD TO LEVEL OF USE IVA ROUTINE. With individuals moving upwards, the proportion of individuals

gradually increases until they reach Level of Use IVA and then decreases; for individuals moving downward, the movement again converges on IVA. This is particularly true of innovation users. With the nonusers, however, a large proportion (34.7 percent) of those at Level of Use I move back to Level of Use 0.

Table 7

Overall Summary of LoU Movement Tendencies for Two Innovations

		TEAMING		MODULES	
LEVELS OF USE		Percent Going Down	Percent Going Up	Percent Going Down	Percent Going Up
0	Nonuse		30.5		28.0
I	Orientation	34.7	40.8	24.7	33.3
II	Preparation	13.0	69.6	37.3	37.2
III	Mechanical Use	13.3	67.7	30.4	52.1
IVA	Routine	10.8	15.1	22.3	34.6
IVB	Refinement	62.3	14.7	42.1	17.6
V	Integration	66.6	19.2	65.9	19.5
VI	Renewal	88.9		86.7	

A Case Study of Teachers Implementing the SCIS Science Curriculum. A small case study was also carried out during the summer and school year of 1975-76. During this period, data were collected at four points: (1) before a summer workshop in July, (2) at the beginning of the school year in September, (3) in the middle of the school year, and (4) in the spring. These data were collected as teachers (N = ~~38~~ 54) were implementing the SCIS (Science Curriculum Improvement Study) curriculum. The teachers were of two kinds as the study began: those teachers who had already taught the physical science units of SCIS for one year and those teachers who had not taught SCIS at all. Both groups were involved in a summer workshop which was introducing them to the biological strand of the SCIS materials. These data provide a shorter time interval between the collection points than did the teaming and module data.

The same general trends appear to hold as illustrated in Figure 7.

There were no Level of Use 0 individuals until January. By April, the number had increased to five. This can be interpreted from our clinical data that indicated that these teachers began the year in good faith believing that they would be using the SCIS materials; however, as the year moved along, they became aware of institutional and organizational conditions and constraints, as well as perhaps some personal condition, that led to their not having an opportunity to use SCIS and their not seeing it in their future.

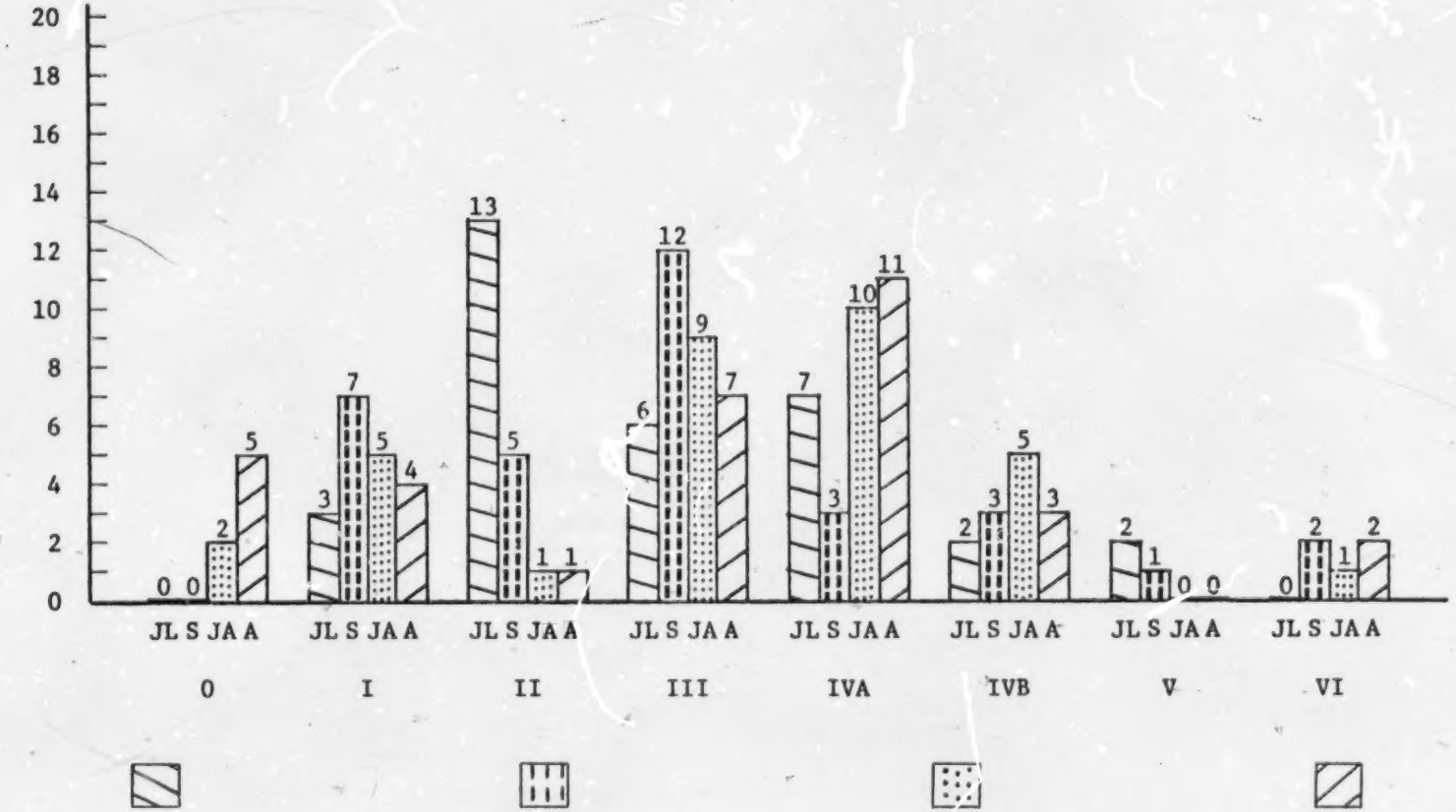
The number of individuals at Level of Use II was highest in July (N = 13) and plummeted down so that by January, only one individual was still at a Level of Use II. It is interesting to note further that as mentioned before, there is an increase in the number of individuals at Level of Use III at the beginning of the school year in September and this number decreases as the year moves along. Again, as before, all of the individuals at Level of Use III did not disappear by the end of the first year of use. The number of individuals at Level of Use IVA did, however, increase as the year progressed.

Summary and Discussion

The concept of Levels of Use of the Innovation and the data presented here have several implications for evaluators, staff developers, researchers, and persons studying change. The data indicate that the different hypothesized Levels of Use do exist. These have been reliably measured and demonstrated for three different innovations in this paper, and in addition, nine other innovations have been studied as a part of the research of the Procedures for Adopting Educational Innovations Project. Each of the Levels of Use has been identified in both school and higher education settings.

Figure 7

The Number of Individuals at Each Level of Use of SCIS
at Four Points During a Ten Month Period



It appears that individuals move to a Routine Level of Use IVA and then move in and out of this level as a kind of stable base or foundation from which to refine their use. Further, it appears that most individuals begin use at a Mechanical Level (LoU III) and that this level is not necessarily resolved by the end of the first cycle of use. LoU III may last into a second or perhaps even a third year of use.

There is movement both up and down the levels, and there is a possibility of levels being skipped. However, it is not known whether levels are actually skipped or whether our data collection periods were too wide-spread. This remains to be explored in future studies.

It is also clear that institutional variables, interventions, conditions, the unit manager (e.g., principal, dean), all have an impact on whether or not an individual's Levels of Use move developmentally, whether use continues, or whether it stops.

These findings have several implications. Evaluators need to give careful consideration to Levels of Use in designing studies and interpreting data. Since several Levels of Use may exist within a given population, and a sample of users stratified according to years of experience results in unequal distribution of the levels, then evaluators need to have knowledge of the Level of Use of the individuals who are using the innovation before they start making claims about the effects of the innovation. It is conceivable that individuals at a Mechanical Level of Use of a "proven" innovation could achieve lower outcomes than a "control group" since their Mechanical Level of Use brings with it certain stresses and strains that could be altering the innovation into ineffective modes. Perhaps innovation users in evaluation studies should be at Level of Use IVA Routine use. At that level, they have a stable way of using the innovation, and they are not making any kinds of adaptations in that use.

Only then could stable use of the innovation be validly assessed.

An implication for staff developers is that at different Levels of Use different kinds of staff development activities are needed. Perhaps Levels of Use offers a way of individualizing staff development activities. One large-scale research study currently underway explores this hypothesis. Individuals at a Mechanical Level of Use may need and find relevant very different staff development activities than do those at a Level of Use IVB.

Finally, an implication exists for policy makers. It appears that there is need for a "truth in packaging act" whereby evaluators and innovation developers would provide perspective adopters of their innovations with information about the Levels of Use under which they got the reported evaluation results. It is quite possible that individuals functioning at Level of Use IVB during a field test will get different evaluation results than a group of teachers in a normal school context who are functioning at a Level of Use III Mechanical level. We suspect that it would be worthwhile to have evaluators who describe the outcomes that were obtained with students with regard to the innovation also report the exact Levels of Use of the individuals using the innovation who achieved those results. One exploratory study of this particular hypothesis has been conducted (Loucks, 1975; Hall & Loucks, 1976); however, it does appear that the Level of Use of individuals does make a difference in terms of the outcomes that are obtained with students.

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